**Structural Equation Modeling and Meta-Analysis**

PSYC 892-001

Spring 2022

Tuesdays and Thursdays, 1:30-2:45

Research Hall, Rm 201



Instructor: Dr. Seth Kaplan Office: 3073 David King Hall

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Office Hours: Tuesdays, 2:45-3:45 or by appt.



**COURSE OVERVIEW AND COURSE OBJECTIVES**

This class covers two different methodological/statistical topics - meta-analysis and structural equation modeling (SEM). We will spend the first part of the semester going over meta-analysis and then will cover SEM.

Over about the past 30 years, both of these “methodologies” have become increasingly common and important in psychological research (as in many other areas in the social sciences and beyond). Gaining a thorough understanding of these topics will benefit you as a researcher and a consumer of research.

This class is meant to provide you with practical knowledge with regard to conducting, interpreting, and applying (findings) for these methodologies. As such, we will focus mostly on the “how to” instead of concentrating on the underlying mathematics. That said, having some understanding of the conceptual and mathematical underpinnings of the methodologies also is essential in conducting and interpreting (results from) them appropriately. Thus, we also will cover some of this more conceptual material.



**COURSE FORMAT AND PHILOSOPHY**

The class meets twice a week. For the most part, the meetings will consist of a mix of lecturing, discussion, and hands-on activities/exercises. The specific format of each meeting will vary, depending on the topic we are covering. My expectation is that students will attend every class meeting and will be actively engaged during class sessions (e.g., not texting, on Facebook, etc.) Also, please read the corresponding material before it is discussed in class as such will maximize learning.



**PROJECTS AND COURSE EVALUATION**

Over the course of the semester, you will be required to complete several projects. The largest project will be a comprehensive meta-analysis in an area of your choosing. It will be due on the date of the final exam (May 17th) and will be worth 40% of your course grade. This project may be done alone or with one classmate, although I would strongly recommend pairing up with someone in order to share the workload.

The remainder of your grade will be based on smaller projects, each worth 10% of your grade. Five of these six projects are SEM-related; one is meta-analysis related. Thus, as a set, these projects will constitute 60% of your class grade. You are free to work with one other classmate on each of these as well.

I will determine final course grades using the scale below

| A+ 98-100 | A 93-97 | A- 90-92 | B+ 87-89 |
| --- | --- | --- | --- |
| B 83-86 | B- 80-82 | C+ 77-79 | C 73-76 |
| C- 70-72 | D+ 67-69 | D 63-66 | D- 60-62 |



**ADMINISTRATIVE STUFF**

**Texts:**

Borenstein, M. Hedges, L.V., Higgins, J.P.T., & Rothstein, H.R. (2009).

*Introduction to meta-analysis*. Chichester, England: Wiley. (Available in Blackboard and also [HERE](https://wrlc-gm.primo.exlibrisgroup.com/discovery/fulldisplay?docid=cdi_askewsholts_vlebooks_9780470743379&context=PC&vid=01WRLC_GML:01WRLC_GML&lang=en&search_scope=MyInst_and_CI&adaptor=Primo%20Central&tab=Everything&query=any,contains,Borenstein,%20M.%20Hedges,%20L.V.,%20Higgins,%20J.P.T.,%20%26%20Rothstein,%20H.R.%20(2009).%20%20Introduction%20to%20meta-analysis.%20Chichester,%20England:%20Wiley.&offset=0))

Kline, R.B. (2016). *Principles and practice of structural equation modeling*,

4th ed. New York: The Guilford Press.

Companion website: https://www.guilford.com/companion-site/Principles-and-Practice-of- Structural-Equation-Modeling-Fourth-Edition/9781462523344

**Software:**

We mainly will be using **R** and **JASP** for this class. If time permits (and there is interest), I also will show you SEM in **Mplus**.

* **Installing R and RStudio**: You will need to install both R and RStudio. These are two different installations. For instructions for installing these, [HERE](https://moderndive.netlify.app/1-getting-started.html) is a good set of instructions ([HERE](https://techvidvan.com/tutorials/install-r/) is another set of instructions, but you should only need the first one).

There are a ton of excellent resources for R. [HERE](https://stats.oarc.ucla.edu/stat/data/intro_r/intro_r_interactive.html#(1)) is a good place to get started.

* **Installing JASP**: Go [HERE](https://jasp-stats.org/) to download **JASP**.
* **Installing Mplus**: Again, we may or may not get to **Mplus** (depending on whether we have time and on whether people have interest). In any case, if you are interested in downloading the free demo version, go [HERE](https://www.statmodel.com/demo.shtml).

**Attendance and Participation**: My expectation is that students will attend every class meeting and will be actively engaged during class sessions. *You will need to complete an additional assignment for each class you miss beyond a first missed class (e.g., if you miss three classes, you would have to complete two additional assignments). All make-up assignments are due on* ***May 10th****. Failure to adequately complete make-up assignments will result in failing the course.*

**Honor Code Statement:** All aspects of this course are bound by the George Mason University Honor Code which states that, “Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.” Any student who engages in scholastic dishonesty, inadvertently or not, will be reported directly to the Honor Committee.

**Students with Disabilities:** If you are student with disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

**Blackboard:** The readings for this class will be posted on Blackboard. Please let me know if you have difficulty using the system or accessing any of the course material.

**Communicating with me:** When you would like to contact me (e.g., with questions), please e-mail me! Absent my experiencing some emergency, I will respond to your e-mail within 24 hours.

**Official Communications via GMU Email:** Mason uses electronic mail to provide official information to students. Examples include communications from course instructors, notices from the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their mason email account, and are required to activate that account and check it regularly.

**Class Cancellation Policy:** If a class needs to be canceled, you will receive notification from the University (and/or I will e-mail to inform you). If no makeup class is scheduled (in the case that the University cancels the class), I will make a video lecture covering the missed material.

**Diversity, Inclusion, and Class Etiquette:** This class will bea “safe space”, which means we commit to: (1) Making our class a welcoming, open space for everyone; (2) Being aware of our prejudices and insecurities and how our words affect others; (3) Providing room for each of us to explore our own identities; (4) Allowing others to define their own identities and to speak for themselves; (5) Respecting the privacy of others by maintaining confidentiality.

I welcome and value individuals and their differences, including gender expression and identity, race, economic status, class, sex, sexuality, ethnicity, national origin, first language, religion, age and ability. If you ever feel that any aspect of your identity is not wholly respected and appreciated in this class, please contact me.

**Sexual Harassment, Sexual Misconduct, and Interpersonal Violence:** *As a faculty member and designated “Responsible Employee,” I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s* [*Title IX Coordinator*](https://diversity.gmu.edu/sexual-misconduct) *per* [*university policy 1412*](https://universitypolicy.gmu.edu/policies/reporting-of-clery-act-crimes-andor-prohibited-sexual-conduct/)*. If you wish to speak with someone confidentially, please contact the* [*Student Support and Advocacy Center*](http://ssac.gmu.edu/) *(703-380-1434) or* [*Counseling and Psychological Services*](https://caps.gmu.edu/) *(703-993-2380). You may also seek assistance from* [*Mason’s Title IX Coordinator*](https://diversity.gmu.edu/sexual-misconduct) *(703-993-8730;* [*titleix@gmu.edu*](mailto:titleix@gmu.edu)*).*

**Safe Return to Campus:** All students taking courses with a face-to-face component are required to follow the university’s public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage (<https://www2.gmu.edu/safe-return-campus>). Similarly, all students in face-to-face and hybrid courses must also complete the Mason COVID Health Check daily, seven days a week. The COVID Health Check system uses a color code system and students will receive either a Green, Yellow, or Red email response. Only students who receive a “green” notification are permitted to attend courses with a face-to-face component. If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

* Students are required to follow Mason's current policy about facemask-wearing. As of August 11, 2021, all community members are required to wear a facemask in all indoor settings, including classrooms. An [appropriate facemask](https://www2.gmu.edu/safe-return-campus/personal-and-public-health/face-coverings) must cover your nose and mouth at all times in our classroom. If this policy changes, you will be informed; however, students who prefer to wear masks either temporarily or consistently will always be welcome in the classroom.

**Changes to Syllabus:** The instructor reserves the right to make necessary changes to the syllabus with reasonable advance notice.

**Important Dates:** Last day to add the course is Monday, January 30th. Last day to drop the course is Tuesday, March 1st. https://registrar.gmu.edu/calendars/spring\_2022-1/#dates



**COURSE SCHEDULE**

I will try to adhere to this schedule. But, please recognize that we may need to deviate from it to some degree. If I need to make changes, I will do so on an electronic version of this syllabus [HERE](https://docs.google.com/document/d/1l2lwByqBXAhU8JuGFkEH2CuLP6b8OKV2/edit?usp=sharing&ouid=101510493878498059035&rtpof=true&sd=true). I obviously will let you know of any changes I need to make in class as well.

| **DATE** | **Topic/Event/Assignment/Readings** |
| --- | --- |
| 1/25 | **Overview of Class and Introduction to/ Overview of Meta-Analysis** |
|  | Before next class, read   * Borenstein et al (2009): Preface, Chapters 1 and 2 * \*Steel et al (2021). The anatomy of an award-winning   meta-analysis. . .  \*\*This is an excellent resource that we may revisit throughout the class. Please read the whole paper (though I recognize that parts may not make complete sense at this point ).  *\*\*Additional Readings on Meta-Analysis (Overviews, Future Direction)\*\**  Buecker, S., Stricker, J., & Schneider, M. (2021). Central questions about meta-analyses in psychological research: An annotated reading list. *Current Psychology*. <https://doi.org/10.1007/s12144-021-01957-4>  DeSimone, J. A., Brannick, M. T., O’Boyle, E. H., & Ryu, J. W. (2020). Recommendations for Reviewing Meta-Analyses in Organizational Research. *Organizational Research Methods*, 109442812096708. https://doi.org/10.1177/1094428120967089  Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies: A typology of reviews, *Maria J. Grant & Andrew Booth*. *Health Information & Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x  Ioannidis, J. (2017). Next-generation systematic reviews: Prospective meta-analysis, individual-level data, networks and umbrella reviews. *British Journal of Sports Medicine*, *51*(20), 1456–1458. https://doi.org/10.1136/bjsports-2017-097621  Upreti, B. R., Asatiani, A., & Malo, P. (2016). To Reach the Clouds: Application of Topic Models to the Meta-Review on Cloud Computing Literature. *2016 49th Hawaii International Conference on System Sciences (HICSS)*, 3979–3988. https://doi.org/10.1109/HICSS.2016.493 |
| 1/27 | **Overview of Meta-Analysis (cont)/ Finding and Coding Effect Sizes** |
| 1/30 | Complete Meta-Analysis Assignment 1 by 1/30 at 5pm |
|  | Before next class, read   * Harari, M. B., Parola, H. R., Hartwell, C. J., Riegelman, A. (2020). Literature searches in systematic reviews and meta-analyses: A review, evaluation, and recommendations. *Journal of Vocational Behavior.* https://doi.org/10.1016/j.jvb.2020.103377.   *\*\*Additional Readings on the Logistics of Conducting Meta-Analyses\*\**  [Meta-Analysis Links/Resources](https://docs.google.com/document/d/1RBovTbvZO6R7zaojNmVVnKpXwkTiBQ2qe0BGchoxFT8/edit?usp=sharing)  Aguinis, H., Dalton, D. R., Bosco, F. A., Pierce, C. A., & Dalton, C. M.  (2011). Meta-Analytic choices and judgment calls: Implications for theory  building and testing, obtained effect Sizes, and scholarly Impact. *Journal*  *of Management*, *37*(1), 5–38.<https://doi.org/10.1177/0149206310377113>  Aytug, Z. G., Rothstein, H. R., Zhou, W., & Kern, M. C. (2012). Revealed or concealed? Transparency of procedures, decisions, and judgment calls in meta-analyses. *Organizational Research Methods*, *15*(1), 103–133. <https://doi.org/10.1177/1094428111403495>  Bosco, F. A., Uggerslev, K. L., & Steel, P. (2017). metaBUS as a vehicle for facilitating meta-analysis. Human Resource Management Review, 27, 237-254.  Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta‐analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods*, *11*(2), 181–217. https://doi.org/10.1002/jrsm.1378    Levac, D., Colquhoun, H., & O’Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science*, *5*(1), 69. <https://doi.org/10.1186/1748-5908-5-69>  Marshall, I. J., Noel‐Storr, A., Kuiper, J., Thomas, J., & Wallace, B. C. (2018). Machine learning for identifying Randomized Controlled Trials: An evaluation and practitioner’s guide. *Research Synthesis Methods*, *9*(4), 602–614. <https://doi.org/10.1002/jrsm.1287>  McKenzie, J. E., et al (2019). Summarizing study characteristics and preparing for synthesis. In J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions* (1st ed., pp. 229–240). Wiley. https://doi.org/10.1002/9781119536604.ch9  Ones, D., Viswesvaran, C., & Schmidt, F. L. (2017). Realizing the full potential of psychometric meta-analysis for a cumulative science and practice of human resource management. *Human Resource Management Review*.  Page, M. J., et al. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ*, n160. https://doi.org/10.1136/bmj.n160  Quintana, S. M., & Minami, T. (2006). Guidelines for meta-analyses of counseling psychology research. *The Counseling Psychologist*, *34*(6), 839–877. <https://doi.org/10.1177/0011000006286991>  Silberzahn, R., et al (2018). Many Analysts, One Data Set: Making Transparent How Variations in Analytic Choices Affect Results. *Advances in Methods and Practices in Psychological Science*, *1*(3), 337–356. <https://doi.org/10.1177/2515245917747646>  van de Schoot, R., de Bruin, J., Schram, R., Zahedi, P., de Boer, J., Weijdema, F., et al. (2021). An Open Source Machine Learning Framework for Efficient and Transparent Systematic Reviews. *Nat. Machine Intelligence* 3, 125–133. doi:10.1038/s42256-020-00287-7  Wanous, J.P., Sullivan, S.E., & Malinak, J. (1989). The role of judgment calls in meta-analysis. *Journal of Applied Psychology, 74,* 259-264. |
| 2/1 | **Finding and Coding Effect Sizes** |
|  | Before next class, read   * \*Borenstein et al (2009): Chapters 3-8   \*There is a lot of information here. You do not need to know all the formulae. Focus on the different types of effect sizes and converting among them.   * Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense*. Advances in Methods and Practices in Psychological Science, 2,* 156-168. https://doi.org/10.1177/2515245919847202\   *\*\*Additional Readings on Effect Sizes and Computations\*\**  Carter, E. C., & McCullough, M. E. (2018). A simple, principled approach to combining evidence from meta-analysis and high-quality peplications. *Advances in Methods and Practices in Psychological Science*, *1*(2), 174–185. https://doi.org/10.1177/2515245918756858  Dahlke, J. A., & Wiernik, B. M. (2018). psychmeta: An R Package for psychometric meta-analysis. *Applied Psychological Measurement*, 0146621618795933. https://doi.org/10.1177/0146621618795933  Henson, R. K. (2006). Effect-Size Measures and Meta-Analytic Thinking in Counseling Psychology Research. *The Counseling Psychologist*, *34*(5), 601–629. <https://doi.org/10.1177/0011000005283558>  Morris, S.B., & DeShon, R.P. (2002). Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. *Psychological Methods, 7,* 105-125.  Viechtbauer , W. (2010). Conducting Meta-Analyses in R with the metafor Package. *Journal of Statistical Software, 36(3), 1-48* |
| 2/3 | **Computing Effect Sizes** |
| 2/8 | **Computing Effect Sizes** |
|  | Before we begin talking about heterogeneity, please read:   * Borenstein et al., Chapter 10-17   Before we begin talking about study artifacts, please read the following (I will let you know when that is before we get to the topic in class):   * Chapter 38 inBorenstein et al. * Wiernik, B. M., & Dahlke, J. A. (2020). Obtaining unbiased results in meta-analysis: The importance of correcting for statistical artifacts. *Advances in Methods and Practices in Psychological Science*, *3*, 94–123. https://doi.org/10.1177/2515245919885611   *\*Additional Readings on Heterogeneity of Effect Sizes and Study Artifacts\*\*\**  Chapters 3 and 4 in Hunter and Schmidt (2015)  Erp, S. van, Verhagen, J., Grasman, R. P. P. P., & Wagenmakers, E.-J. (2017). Estimates of between-study heterogeneity for 705 meta-analyses reported in *Psychological Bulletin* From 1990–2013. *Journal of Open Psychology Data*, *5*(1), 4. <https://doi.org/10.5334/jopd.33>  Kenny, D. A., & Judd, C. M. (2019). The unappreciated heterogeneity of effect sizes: Implications for power, precision, planning of research, and replication. *Psychological Methods*, *24*(5), 578–589. <https://doi.org/10.1037/met0000209>  Klein, R. A., Vianello, M., Hasselman, F., Adams, B. G., Reginald B. Adams, J., Alper, S., Aveyard, M., Axt, J. R., Babalola, M. T., Bahník, Š., Batra, R., Berkics, M., Bernstein, M. J., Berry, D. R., Bialobrzeska, O., Binan, E. D., Bocian, K., Brandt, M. J., Busching, R., … Nosek, B. A. (2018). Many Labs 2: Investigating Variation in Replicability Across Samples and Settings: *Advances in Methods and Practices in Psychological Science*. <https://doi.org/10.1177/2515245918810225>  Paterson, T. A., Harms, P., Steel, P., & Credé, M. (2016). An assessment of the magnitude of effect sizes evidence from 30 years of meta-analysis in management. *Journal of Leadership & Organizational Studies, 23,* 66-81.  Schmidt, F.L. & Hunter, J.E. (1977). Development of a general solution to  the problem of validity generalization*. Journal of Applied Psychology, 62,* 529-540.  Stanley, T. D., Carter, E. C., & Doucouliagos, H. (2018). What meta-analyses reveal about the replicability of psychological research. *Psychological Bulletin*, *144*(12), 1325–1346. https://doi.org/10.1037/bul0000169 |
| 2/10 | **Heterogeneity and Study Artifacts (and Psychometric Meta-Analysis)** |
| 2/15 | **Heterogeneity and Study Artifacts (and Psychometric Meta-Analysis)** |
| 2/17 | **Heterogeneity and Study Artifacts (and Psychometric Meta-Analysis)** |
|  | Before we begin talking about moderators, please read:   * Borenstein et al., Chapters 19-21   *\*\*Additional Readings on Meta-Analytic Moderators\*\**  Aguinis, H., Gottfredson, R.K., & Wright, T.A. (2011). Best-practice recommendations for estimating interaction effects using meta-analysis. *Journal of Organizational Behavior, 32,* 1033–1043.  Aguinis, H., Sturman, M.C., & Pierce, C.A. (2008). Comparison of three meta-analytic procedures for estimating moderating effects of categorical variables. *Organizational Research Methods, 11,* 9-34.  Cortina, J.M. (2003). Apples and oranges (and pears, Oh My!): The search for moderators in meta-analysis. *Organizational Research Methods, 6,* 415-439. |
| 2/22 | **Meta-Analytic Moderators** |
|  | Before we begin talking about “Other Issues”, please read:   * Borenstein et al., Chapter 30 and * Aguinis, H., Pierce, C. A., Bosco, F. A, Dalton, D. R., & Dalton, C. M. (2011). Debunking myths and urban legends about meta-analysis. *Organizational Research Methods, 14*, 306-331. * Oh, I. S. (2020). Beyond meta-analysis: Secondary uses of meta-analytic data. Annual Review of Organizational Psychology and Organizational Behavior, 7, 125–153.   \*\*Additional Readings on Other Issues\*\*  Cheung, M. W.-L., & Chan, W. (2005). Meta-analytic structural equation modeling: A two-stage approach. *Psychological Methods*, *10*(1), 40–64. <https://doi.org/10.1037/1082-989X.10.1.40>  Cheung M. W. (2015). metaSEM: an R package for meta-analysis using structural equation modeling. *Frontiers in Psychology, 5,* 1521. doi:10.3389/fpsyg.2014.01521  Duyx, B., Urlings, M. J. E., Swaen, G. M. H., Bouter, L. M., & Zeegers, M. P. (2017). Scientific citations favor positive results: A systematic review and meta-analysis. *Journal of Clinical Epidemiology*, *88*, 92–101. <https://doi.org/10.1016/j.jclinepi.2017.06.002>  Fernandez-Castilla, B., Jamshidi, L., Declercq, L., Beretvas, S., Onghena, P., Van den Noortgate, W. (2020). The Application of Meta-Analytic (Multi-Level) Models with Multiple Random Effects: A Systematic Review. *Behavior Research Methods*. doi.org/10.3758/s13428-020-01373-9  Gooty, J., Banks, G. C., Loignon, A. C., Tonidandel, S., & Williams, C. E. (2021). Meta-Analyses as a Multi-Level Model. Organizational Research Methods, 24(2), 389–411. https://doi.org/10.1177/1094428119857471  Jak, S., & Cheung, M.W.-L. (in press). Meta-analytic structural equation modeling with moderating effects on SEM parameters. *Psychological Methods*  Kepes, S., & McDaniel, M. A. (2014). *Publication bias: Causes, detection, and remediation*. <https://doi.org/10.13140/2.1.3617.4727>  Landis, R. S. (2013). Successfully combining meta-analysis and structural equation modeling: Recommendations and strategies. *Journal of Business and Psychology*, *28*(3), 251–261. https://doi.org/10.1007/s10869-013-9285-x  López‐López, J. A., Page, M. J., Lipsey, M. W., & Higgins, J. P. T. (2018). Dealing with effect size multiplicity in systematic reviews and meta‐analyses. *Research Synthesis Methods*, *9*(3), 336–351. https://doi.org/10.1002/jrsm.1310  Sheng, Z., Kong, W., Cortina, J. M., & Hou, S. (2016). Analyzing matrices of meta-analytic correlations: Current practices and recommendations. *Research Synthesis Methods*, *7*(2), 187–208. https://doi.org/10.1002/jrsm.1206  Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2015). Meta-analysis of multiple outcomes: A multilevel approach. *Behavior Research Methods*, *47*(4), 1274–1294. https://doi.org/10.3758/s13428-014-0527-2  Viechtbauer, W., & Cheung, M.W.-L. (2010). Outlier and influence diagnostics for meta-analysis. *Research Synthesis Methods,1,* 112-125.  Viswesvaran C., Ones D. S. (1995). Theory testing: combining psychometric meta-analysis and structural equations modeling. Pers. Psychol. 48, 865–885 10.1111/j.1744-6570.1995.tb01784.x |
| 2/24 | **Meta-Analytic Moderators and Other Issues in Meta-Analysis (e.g., Publication Bias, Outliers, Multiple Effects from the same study, Meta-SEM)** |
| 3/1 | **Other Issues in Meta-Analysis (cont.)** |
|  | Before next class, please read:   * Kline (2016), Chapters 1-4 (much of this material is review), and Chapter 6 |
| 3/3 | **Introduction to/Overview of SEM** |
|  | Before next class, please read:   * Kline (2016), Chapter 7 and Chapter 11 |
| 3/8 | **Introduction to/Overview of SEM (cont)/ Initial Considerations in SEM** |
| 3/10 | **Initial Considerations in SEM (cont)** |
| 3/15 & 3/17 | **Spring Recess – No Class** |
|  | Before next class, please read   * Kline (2016), Chapter 9,12 and Chapter 13   McNeish, Daniel, and Melisa Gordon Wolf. 2020. Dynamic Fit Index Cutoffs for Confirmatory Factor Analysis Models. PsyArXiv  \*\*Additional Readings on Fit\*\*  McNeish, D., An, J., & Hancock, G. R. (2018). The thorny relation between measurement quality and fit index cutoffs in latent variable models. Journal of Personality Assessment,  100(1), 43–52 |
| 3/22 | **CFA/Measurement Models** |
| 3/22 | SEM Assignment 1 Due |
|  | Please read the following before next class:   * Flora, D. B., & Curran, P. J. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. Psychological Methods, 9, 466–491.(\*Focus on the first few pages) You can find this paper [HERE](https://www.statmodel.com/download/floracurran.pdf) * Credé, M., & Harms, P.D. (2015). 25 years of higher-order confirmatory factor analysis in the organizational sciences: A critical review and development of reporting recommendations. Journal of Organizational Behavior, 36, 845-872.doi:10.1002/job.2008 |
| 3/24 | **CFA/Measurement Models (cont)** |
|  | Before the next class, please read   * Kline (2016), Chapter 10 and Chapter 14 |
| 3/29 | **Full SEM Models** |
| 3/31 | **SEM Assignment 2 Due** |
| 3/31 | **Full SEM Models** **(cont)** |
|  | Before the next class, please read:   * Kline (2016), Chapter 16 |
| 4/5 | **Multiple-group SEM/Invariance Testing** |
| 4/7 | **SEM Assignment 3 Due** |
| 4/7 | **Multiple-group SEM/Invariance Testing (cont)** |
|  | Before the next class, please read:   * Kline (2016), Chapter 15   \*\*Additional Readings on Measurement Invariance\*\*  Bauer, D. J. (2017). A more general model for testing measurement invariance and differential item functioning. Psychological Methods, 22(3), 507-526. doi:10.1037/met0000077 |
| 4/12 | **Advanced Topics in SEM (Mean Structures, LGCM)** |
| 4/14 | **SEM Assignment 4 Due** |
| 4/14 | **Advanced Topics in SEM (Mean Structures, LGCM)** |
|  | Before the next class, please read:   * Kline (2016), Chapter 17 |
| 4/19 | **Advanced Topics in SEM (Interactions, Multilevel SEM)** |
| 4/21 | **Advanced Topics in SEM (Interactions, Multilevel SEM)** |
| 4/26 | **Meta-Analysis Presentations** |
| 4/28 | **No Class – Many of us will be away at a conference** |
| 5/3 | **Meta-Analysis Presentations** |
| 5/5 | **Meta-Analysis Presentations** |
| 5/5 | SEM Assignment 5 Due |
| 5/17 | Meta-Analysis Project Due by 1:30 |